

### REMARKS

At the outset, the Examiner is thanked for the thorough review and consideration of the pending application. The Final Office Action dated May 25, 2010 has been received and its contents carefully reviewed.

Claims 6, 15, and 18 are hereby amended. Support for the amendment can be found, for example, *Specification*, page 6, lines 4-10. No new matter has been added. Accordingly, claims 6, 8, and 11-18 are currently pending. Reexamination and reconsideration of the pending claims are respectfully requested.

The Office Action objects to claim 18 for the use of term “preferable.” Applicants have amended claim 18 to remove the term. Applicants therefore respectfully request withdrawal of the objection to claim 18.

The Office Action rejects claims 6, 8, 11-13 and 16-18 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2003/0091610 to Hird et al. (*Hird*) in view of U.S. Patent No. 6,369,121 to Catalfamo et al. (*Catalfamo*) and U.S. Patent Application Publication No. 2003/0134918 to Ko et al. (*Ko*), as evidenced by U.S. Patent No. 5,633,220 to Cawiezel et al. (*Cawiezel*) and U.S. Patent No. 5,948,855 to Lin et al. (*Lin*). Applicants respectfully traverse the rejection.

Claim 6 recites “a solid polymer foam, which is formed of a crosslinked, exclusively hydrocarbon copolymer, the hydrocarbon copolymer consisting of styrene and divinylbenzene monomers, and which exhibits a density at least equal to  $6 \text{ mg/cm}^3$  and at most equal to  $20 \text{ mg/cm}^3$  and cells with a mean cell diameter of between 2 and 10 micrometers.” *Hird* fails to teach or suggest at least these elements of claim 6. Instead, *Hird* discloses a list of monomers and simply mentions that these monomers could be used in combination. *Hird*, ¶0052. *Hird* does not disclose which specific monomers could be used in combination. The only place where *Hird* cites divinylbenzene is “a monomer combination comprising 2-ethyl-hexylacrylate (EHA) (5.50 g), divinylbenzene (of 43% purity with balance being ethyl styrene) (DVB-42) (3.30 g), and 1,6-hexanediol diacrylate (HDDA) (1.20 g).” *Hird*, ¶0142. But this combination includes 3 different monomers. Therefore, *Hird* is silent with respect to “a crosslinked, exclusively

hydrocarbon copolymer, the hydrocarbon copolymer consisting of styrene and divinylbenzene monomers,” as recited in claim 6.

Furthermore, the solid polymer foam of claim 6 “exhibits a density at least equal to 6 mg/cm<sup>3</sup> **and** at most equal to 20 mg/cm<sup>3</sup> and cells with a mean cell diameter of between 2 and 10 micrometers” and “exhibits a level of impurities by weight of less than 3%, that is to say that the elements present in this foam, other than the constituent carbon and constituent hydrogen of the polymer, represent less than 3% by weight of the weight of said foam.” *Specification*, page 4, lines 5-10. *Hird* only generally discloses the ranges of the density and cell diameter. *Hird*, however, does not disclose polymer foam meeting both the density and cell diameter limitations of claim 6. In other words, *Hird* does not teach or suggest the solid polymer foam of claim 6 and process of making this solid polymer foam.

Claim 6 also recites “providing an organic phase comprising styrene monomers, divinylbenzene monomers and sorbitan monooleate in ethylbenzene, wherein the styrene and divinylbenzene monomers represent from 40 to 60% by weight of the weight of the organic phase and the sorbitan monooleate represents from 20 to 30% by weight of the weight of the organic phase.” The present application explains that “a pore-forming agent, in the case in point ethylbenzene, which, at the same time, is a solvent for the styrenic monomers without being a solvent for the resulting polymer ... the joint use of [ethylbenzene] has provided to make it possible to prepare a very concentrated emulsion, that is to say an emulsion in which the dispersed aqueous phase represents at least 96% of the total volume of this emulsion.” *Specification*, page 4, lines 15-28. *Hird* fails to teach or suggest at least these elements of claim 6. In fact, *Hird* discloses that “[t]he HIPE is formed by combining the aqueous and oil phase components in a ratio ranging from about 8:1 to about 140:1, alternatively from about 10:1 to about 75:1, alternatively from 13:1 to about 65:1, by weight.” *Hird*, ¶0072. *Hird* does not even mention the use of a solvent in the HIPE formation process, let alone the specific solvent (ethylbenzene) recited by claim 6.

*Ko*, *Catalfamo*, *Cawiezel*, and *Lin* do not cure the deficiency of *Hird*. *Ko*, *Catalfamo*, *Cawiezel*, and *Lin* are also silent with respect to the above-recited elements of claim 6. Accordingly, claim 6 is allowable over the combined teaching of *Hird*, *Ko*, *Catalfamo*,

*Cawiezel*, and *Lin*. Claims 8, 11-13 and 16-18 variously depend from claim 6, and are also allowable for at least the same reasons as claim 6.

Furthermore, the solid polymer foams prepared according to processes of claimed invention show unexpected results. Specifically, the inventors have set the goal of “providing ‘polyHIPE’ foams having the lowest possible density and, for this density, the lowest possible mean cell diameter, while exhibiting a satisfactory mechanical strength which allows them to be formed by mechanical machining (for example turning) or by laser.” *Specification*, page 2, line 29, to page 3, line 4. The inventors achieved these goals by providing “a ‘polyHIPE’ foam which is formed from a crosslinked, exclusively hydrocarbon, polymer based on styrenic monomers and which exhibits a density at least equal to 20 mg/cm<sup>3</sup> and cells with a mean diameter at most equal to 20 microns.” *Specification*, page 3, lines 13-18. Thus, it would not have been obvious to one of ordinary skill in the art to combine 5 references (*Hird*, *Ko*, *Catalfamo*, *Cawiezel*, and *Lin*) to arrive at the claimed invention.

Applicants therefore respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claims 6, 8, 11-13 and 16-18.

The Office Action rejects claims 14 and 15 under 35 U.S.C. §103(a) as being unpatentable over *Hird*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin*, and further in view of U.S. Patent Application Publication No. 2003/0036575 to Sasabe et al. (*Sasabe*), as evidence by Lenntech/Deionized water, Water Treatment Handbook, 6<sup>th</sup> Edition, 1991 (*Handbook*).

Claims 14 and 15 variously depend from claim 6, and incorporate all the elements of claim 6. As discussed, the combined teaching of *Hird*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin* fails to teach or suggest at least the above-recited element of claim 6. *Sasabe* and *Handbook* do not cure the deficiency of *Hird*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin*. *Sasabe* and *Handbook* are also silent with respect to the above-recited elements of claim 6. Accordingly, claim 6 and its dependent claims 14 and 15 are allowable over *Hird*, *Catalfamo*, *Ko*, *Cawiezel*, *Lin*, *Sasabe*, and *Handbook*. Applicants therefore respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claims 14 and 15.

The Office Action rejects claim 11 under 35 U.S.C. §103(a) as being unpatentable over *Hird*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin*, and further in view of U.S. Patent No. 6,303,834 to Mork et al. (*Mork*). Applicants respectfully traverse the rejection.

Claim 11 depends from claim 6, and incorporate all the elements of claim 6. As discussed, the combined teaching of *Hird*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin* fails to teach or suggest at least the above-recited elements of claim 6. *Mork* is also silent with respect to the above-recited element of claim 6. Accordingly, claim 6 and its dependent claim 11 are allowable over *Hird*, *Catalfamo*, *Ko*, *Cawiezel*, *Lin*, and *Mork*. Applicants therefore respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claim 11.

The Office Action rejects claims 6, 8, 11-13, and 16-18 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,331,015 to DesMarais et al. (*DesMarais*) in view of *Catalfamo*, *Ko*, *Cawiezel*, and *Lin*. Applicants respectfully traverse the rejection.

Claim 6 recites “a solid polymer foam, which is formed of a crosslinked, exclusively hydrocarbon copolymer, the hydrocarbon copolymer consisting of styrene and divinylbenzene monomers, and which exhibits a density at least equal to 6 mg/cm<sup>3</sup> and at most equal to 20 mg/cm<sup>3</sup> and cells with a mean cell diameter of between 2 and 10 micrometers.” *DesMarais* fails to teach or suggest at least this element of claim 6. Instead, *DesMarais* discloses that “both the monofunctional glassy principal monomer(s) [preferably a styrene-based monomer] and the monofunctional rubbery comonomer(s) must be present in the oil phase” of the HIPE emulsions used to form absorbent foams. *DesMarais*, column 17, lines 39-42, emphasis added. *DesMarais* also discloses that a polyfunctional cross-linking agent component could be added to the monomer and comonomer. *DesMarais*, column 17, lines 60-64. And the polyfunctional cross-linking agent component “can be selected a wide variety of polyfunctional, preferably difunctional, monomers,” which include divinylbenzene. *DesMarais*, column 17, lines 64-66, emphasis added. Because the styrene-based monomer must be used together with a rubbery comonomer, *DesMarais* does not teach or suggest the above-recited element of claim 6 and in fact teaches away from the above-recited element of claim 6.

*Ko*, *Catalfamo*, *Cawiezel*, and *Lin* do not cure the deficiency of *DesMarais*. *Ko*, *Catalfamo*, *Cawiezel*, and *Lin* are also silent with respect to the above-recited elements of claim

6. Accordingly, claim 6 is allowable over the combined teaching of *DesMarais*, *Ko*, *Catalfamo*, *Cawiezel*, and *Lin*. Claims 8, 11-13, and 16-18 variously depend from claim 6, and are also allowable for at least the same reasons as claim 6.

Applicants therefore respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claims 6, 8, 11-13, and 16-18.

The Office Action rejects claims 14 and 15 under 35 U.S.C. §103(a) as being unpatentable over *DesMarais*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin*, and further in view of *Sasabe* and *Handbook*.

Claims 14 and 15 variously depend from claim 6, and incorporate all the elements of claim 6. As discussed, the combined teaching of *DesMarais*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin* fails to teach or suggest at least the above-recited elements of claim 6. *Sasabe* and *Handbook* do not cure the deficiency of *DesMarais*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin*. *Sasabe* and *Handbook* are also silent with respect to the above-recited elements of claim 6. Accordingly, claim 6 and its dependent claims 14 and 15 are allowable over *DesMarais*, *Catalfamo*, *Ko*, *Cawiezel*, *Lin*, *Sasabe*, and *Handbook*. Applicants therefore respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claims 14 and 15.

The Office Action rejects claim 11 under 35 U.S.C. §103(a) as being unpatentable over *DesMarais*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin*, and further in view of *Mork*.

Claim 11 depends from claim 6, and incorporate all the elements of claim 6. As discussed, the combined teaching of *DesMarais*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin* fails to teach or suggest at least the above-recited elements of claim 6. *Mork* does not cure the deficiency of *DesMarais*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin*. *Mork* is also silent with respect to the above-recited elements of claim 6. Accordingly, claim 6 and its dependent claim 11 are allowable over *DesMarais*, *Catalfamo*, *Ko*, *Cawiezel*, *Lin*, and *Mork*. Applicants therefore respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claim 11.

The Office Action rejects claims 6, 8, and 11-18 under 35 U.S.C. §103(a) as being unpatentable over *Sasabe*, in view of *Catalfamo*, *Ko*, *Cawiezel*, and *Lin*. Applicants respectfully traverse the rejection.

Claim 6 recites “a solid polymer foam, which is formed of a crosslinked, exclusively hydrocarbon copolymer, the hydrocarbon copolymer consisting of styrene and divinylbenzene monomers, and which exhibits a density at least equal to 6 mg/cm<sup>3</sup> and at most equal to 20 mg/cm<sup>3</sup> and cells with a mean cell diameter of between 2 and 10 micrometers.” *Sasabe* fails to teach or suggest at least these elements of claim 6. The Office Action admits that “styrene and divinylbenzene are listed by *Sasabe* et al among other monomer as examples of a polymerizable monomer and a cross-linking monomer.” *Office Action*, page 7. *Sasabe* does not specifically teach or suggest “a crosslinked, exclusively hydrocarbon copolymer, the hydrocarbon copolymer consisting of styrene and divinylbenzene monomers.” Furthermore, the solid polymer foam of claim 6 “exhibits a density at least equal to 6 mg/cm<sup>3</sup> and at most equal to 20 mg/cm<sup>3</sup> and cells with a mean cell diameter of between 2 and 10 micrometers” and “exhibits a level of impurities by weight of less than 3%, that is to say that the elements present in this foam, other than the constituent carbon and constituent hydrogen of the polymer, represent less than 3% by weight of the weight of said foam.” *Specification*, page 4, lines 5-10. *Sasabe* only generally describes the density of the polymer and the diameter of the fibers. *Sasabe*, however, does not disclose polymer foam meeting both the density and cell diameter limitations of claim 6. In other words, *Sasabe* does not teach or suggest the solid polymer foam of claim 6 and process of making this solid polymer foam.

*Catalfamo*, *Ko*, *Cawiezel*, and *Lin* do not cure the deficiency of *Sasabe*. *Catalfamo*, *Ko*, *Cawiezel*, and *Lin* are also silent with respect to the above-recited elements of claim 6. Accordingly, claim 6 is allowable over the combined teaching of *Sasabe*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin*. Claims 8 and 11-18 variously depend from claim 6, and are also allowable for at least the same reasons as claim 6.

Applicants therefore respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claims 6, 8, and 11-18.

The Office Action rejects claim 11 under 35 U.S.C. §103(a) as being unpatentable over *Sasabe*, in view of *Catalfamo*, *Ko*, *Cawiezel*, and *Lin*, and further in view of *Mork*. Applicants respectfully traverse the rejection.

Claim 11 depends from claim 6, and incorporate all the elements of claim 6. As discussed, the combined teaching of *Sasabe*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin* fails to teach or suggest at least the above-recited elements of claim 6. *Mork* does not cure the deficiency of *Sasabe*, *Catalfamo*, *Ko*, *Cawiezel*, and *Lin*. *Mork* is also silent with respect to the above-recited elements of claim 6. Accordingly, claim 6 and its dependent claim 11 are allowable over *DesMarais*, *Catalfamo*, *Ko*, *Cawiezel*, *Lin*, and *Mork*. Applicants therefore respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claim 11.

Applicants believe the application is in condition for allowance and early, favorable action is respectfully solicited. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at (202) 496-7500 to discuss the steps necessary for placing the application in condition for allowance. All correspondence should continue to be sent to the below-listed address.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911.

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